



First records of *Mordellochroa humerosa* (Rosenhauer, 1847) from Slovakia (Coleoptera, Mordellidae)

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Abstract

Mordellochroa humerosa (Rosenhauer, 1847) is reported from Slovakia for the first time based on 13 specimens collected in 2017–2020 in two localities. The known distribution of the species and collection circumstances are discussed, and four mtDNA sequences of COI gene fragment are submitted to GenBank and BOLD. Photographs of the habitus and drawings of the diagnostic characters are provided for *M. humerosa*.

Key words

Distribution, Pannonian bioregion, salt marsh, tumbling flower beetles

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Introduction

The genus *Mordellochroa* Emery, 1876 currently comprises 10 species distributed in the Holarctic, Indomalayan, and Australasian realms. Five species occur in the western Palearctic: *M. abdominalis* (Fabricius, 1775), *M. milleri* (Emery, 1876), *M. humerosa* (Rosenhauer, 1847), *M. tournieri* (Emery, 1876) and *M. pulchella* (Mulsant & Rey, 1859) (Horák 2020). The adults are polinivorous, feeding mainly on the flowers of Apiaceae and Rosaceae plants. The larval development is known only in *M. abdominalis*, and it takes place in the wood of various broadleaf trees, especially willows (Borowiec 1996). The taxonomy of the genus is not yet resolved. It comprises at least two groups of species significantly differing in the shape of the male genitalia, and probably representing two separate genera.

Mordellochroa humerosa (Fig. 1A, B) was described based on multiple specimens from Lábatlan in northern Hungary (Rosenhauer 1847). Since then, it has been reported from 21 countries within Europe and central

Asia: Albania (Horák 2008), Bosnia and Herzegovina (Ermisch 1969), Bulgaria (Roubal 1910), Cyprus (Ermisch 1963), France (Batten 1976), Greece (Emery 1876), Hungary, Israel (Horák 2008), Kazakhstan (Odnosum 1992), Macedonia (Horák 2008), Mongolia (Ermisch 1970), Portugal (Baudi de Selve 1878), Romania (Batten 1977), Russia (Emery 1876), Serbia (Schilsky 1898), Slovenia (Schilsky 1894), Spain (Ermisch 1944), Switzerland (Horák 2008), Syria (Schilsky 1894), Turkey (Batten 1977), and Ukraine (Emery 1876). Records show that the species is distributed across the Mediterranean basin and reaches central Europe via the Pannonian basin (Fig. 2). Our aim is to present the first records of *M. humerosa* from Slovakia, which are also the northern most records in Europe. We also summarize, according to the published data, the records of the species within the Pannonian bioregion according to the published data and provide diagnostic characters for its identification.

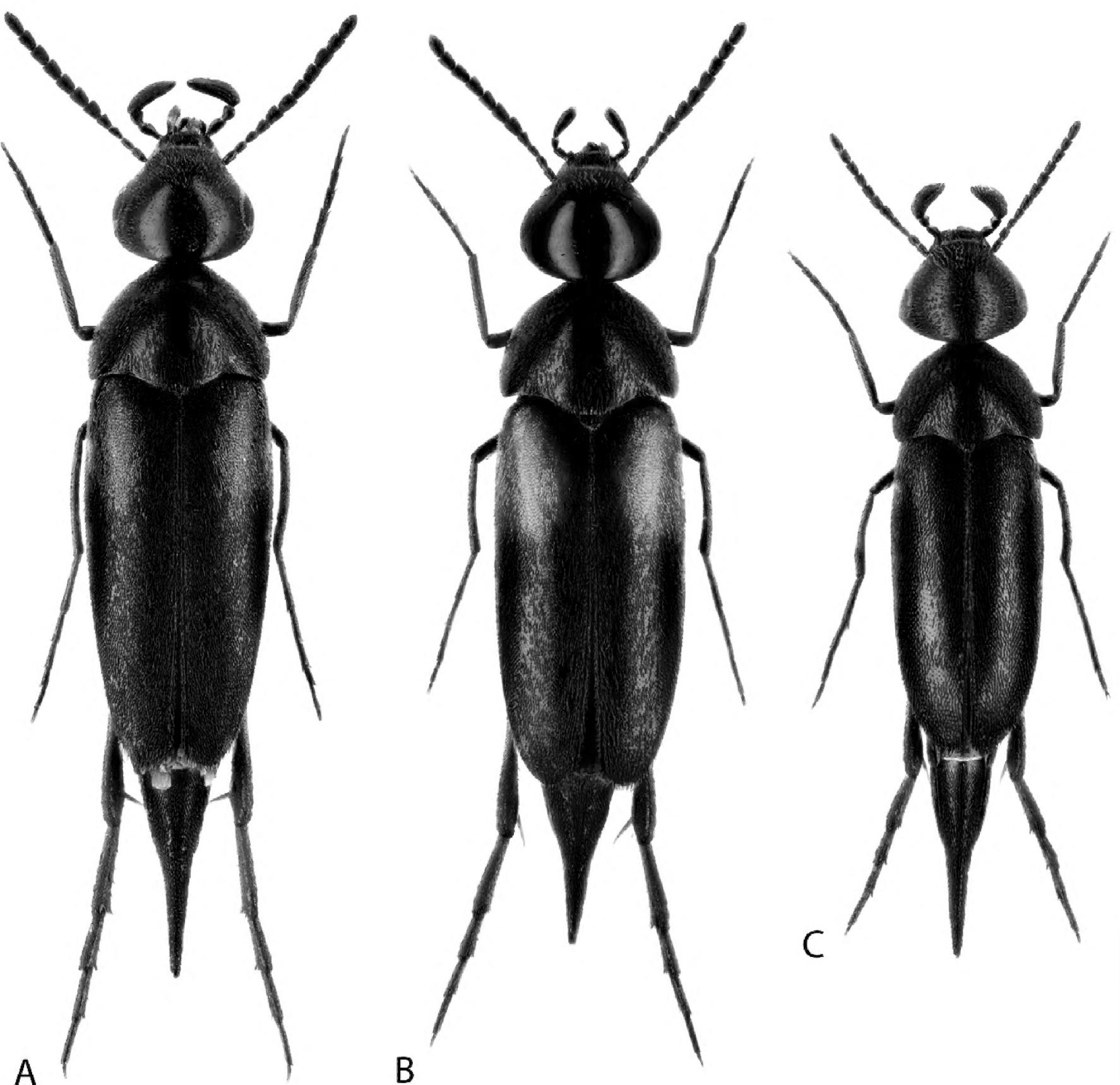


Figure 1. Habitus photographs of two *Mordellochroa* species. **A.** *M. humerosa* (Rosenhauer, 1847), male. **B.** *M. humerosa*, female. **C.** *M. tournieri* (Emery, 1876), male. Scale bar = 1.0 mm.

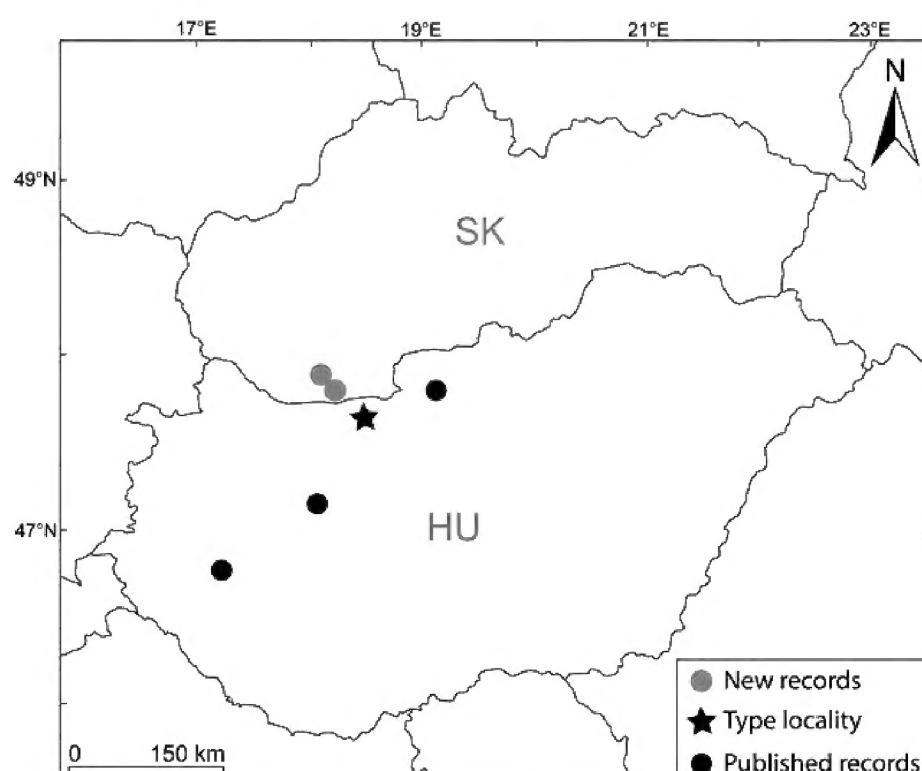


Figure 2. Distribution of *Mordellochroa humerosa* (Rosenhauer, 1847) within the Pannonian basin. Black star shows the type locality, black circles show published records and red circles show new records from Slovakia.

Methods

Specimens treated in the present paper were collected in two localities in southern Slovakia. The first site, near Chotín village ($47^{\circ}48'28''N$, $018^{\circ}11'53''E$; Fig. 3A), is fallow with ruderal habitat situated between a cornfield and a melioration channel. One female of *M. humerosa* was swept from the flowering ruderal vegetation, mainly Wide Carrot (*Daucus carota* L.) and Yellow Bedstraw (*Galium verum* L.) in 2017. The second site, Bokrošské slanisko ($47^{\circ}44'53.2''N$, $018^{\circ}15'38.5''E$; Natura 2000 site SKUEV 0076; Fig. 3B), represents a Pannonic inland salt marsh grazed by goats. Restoration of the salination process and traditional grazing was provided in 2011–2017 as a result of the LIFE project “Restoration of endemic Pannonic salt marshes and sand dunes in southern Slovakia (LIFE10 NAT/SK/083)”. Recently, the pasture and hydrological regime are managed within the project “CZ-SK SOUTH LIFE (LIFE16 NAT/CZ/000001)”.



Figure 3. Habitats of *Mordellochroa humerosa* (Rosenhauer, 1847) in Slovakia. **A.** Collection site near Chotín village (47°48'28"N, 018°11'53"E), a fallow between the cornfield and melioration channel with ruderal vegetation, mainly Wild Carrot (*Daucus carota* L.) and Yellow Bedstraw (*Galium verum* L.). **B.** Collection site at Bokrošské slanisko (47°44'53.2"N, 018°15'38.5"E; Natura 2000 site SKUEV 0076), grazed Pannonic inland salt marsh.

Twelve specimens of *M. humerosa* (Fig. 1A, B), along with the congener *M. tournieri* (Emery, 1876) (Fig. 1C), were collected here in 2019–2020 by sweeping flowering Wild Carrot. The linear distance between the two localities is approximately 8 km. Both are situated in the northern part of the Pannonian bioregion close to the river Danube.

The specimens were killed with ethylacetate and dry mounted on cards or stored in 96.3 % ethanol and processed for DNA extraction. The dissected body parts intended for drawing were treated with lactic acid for several days, then washed with water and temporarily mounted on slides in Berlese's fluid (Swan 1936). Illustrations were made using a drawing tube attached to the Leica DM1000 microscope and edited in Adobe Photoshop CC. Photographs of the habitus were taken with Canon EOS 5D Mark II camera attached to Zeiss Axio Zoom.V16 stereoscope. Image stacks were produced manually, combined using Zerene Stacker v. 1.4 software, and edited in Adobe Photoshop CC. The type specimens are deposited in Muséum national d'Histoire Naturelle, Paris, France (MNHN), and all other examined specimens are deposited in Dávid Selnekovič

collection, Bratislava, Slovakia (DSBS). The mtDNA sequences of the 637 bp long COI gene fragment were amplified from four specimens of *M. humerosa* using LCO1490 and HCO2198 primers (Folmer et al. 1994). The sequences are available from GenBank (MW462091 to MW462094), and BOLD (BTFB073-20, BTFB074-20, BTFB100-20, BTFB101-20). Detailed data regarding the voucher specimens are listed in the “New Records” section. The collection permit (no. OU-NR-OSZP1-018/012945) was provided by the Department of Environmental Care, Ministry of Interior of the Slovak Republic.

Results

Mordellochroa humerosa (Rosenhauer, 1847)

Mordella humerosa Rosenhauer, 1847: 38
Mordellistena humerosa—Stein 1868: 89
Mordellistena (Tolida) humerosa—Emery 1876: 82, 103–104
Tolida humerosa—Winkler 1928: 887
Tolida freyi Ermisch, 1944: 211–214
Mordellochroa humerosa—Ermisch 1950: 78–79
Mordellochroa freyi—Batten 1976: 168

Type material examined. There are two specimens of *M. humerosa* deposited in MNHN, transferred from Rosenhauer's collection, that can be considered syntypes: 1 ♀, pinned, with right mesothoracic leg and antenna missing, labeled: “humerosa Rosenh. Hungaria [handwritten] / Ex Musaeo Rosenhauer”; 1 ♀, pinned, labeled: “HONGRIE / Ex Musaeo Rosenhauer”. The specimens are stored in general collection in the box labeled as “Collection generale, R. Oberthür, Mordella”.

New records. SLOVAKIA • Chotín village env.; 47°48'28"N, 018°11'53"E; 106 m a.s.l.; 12.VII.2017; D. Selnekovič leg.; fallow; 1 ♀, DSBS DS188 • Iža village env., Bokrošské slanisko NR; 47°44'53.2"N, 018°15'38.5"E; 107 m a.s.l.; 29.VII.2019; D. Selnekovič and J. Kodada leg.; GenBank: MW462091 to MW462093; grazed salt marsh; 4 ♂, 2 ♀, DSBS DSBS65 to DSBS67 and DS189 to DS191 • same locality; 16.VIII.2019; D. Selnekovič and J. Kodada leg.; 1 ♀, DSBS DS192 • same locality; 4.VIII.2020; D. Selnekovič and J. Kodada leg.; 1 ♂, 4 ♀, DSBS DS193 to DS197.

Identification. *Mordellochroa humerosa* is characterized by the body black in both sexes, with females having one reddish humeral spot on each elytron (Fig. 1A, B). The vestiture on the dorsal surface is dark grey to black, with a bronze sheen, except for an oval patch of yellowish pubescence located laterally on the anterior quarter of each elytron. The patch of light pubescence extends from the lateral margin of the elytral width, corresponding to the reddish humeral spot in females (Fig. 1A, B). All appendages are black, except the prothoracic legs, which are sometimes brownish in females, and the metatibial spurs, which are yellowish. The male terminal maxillary palpomere is malleiform, rather long and narrow,

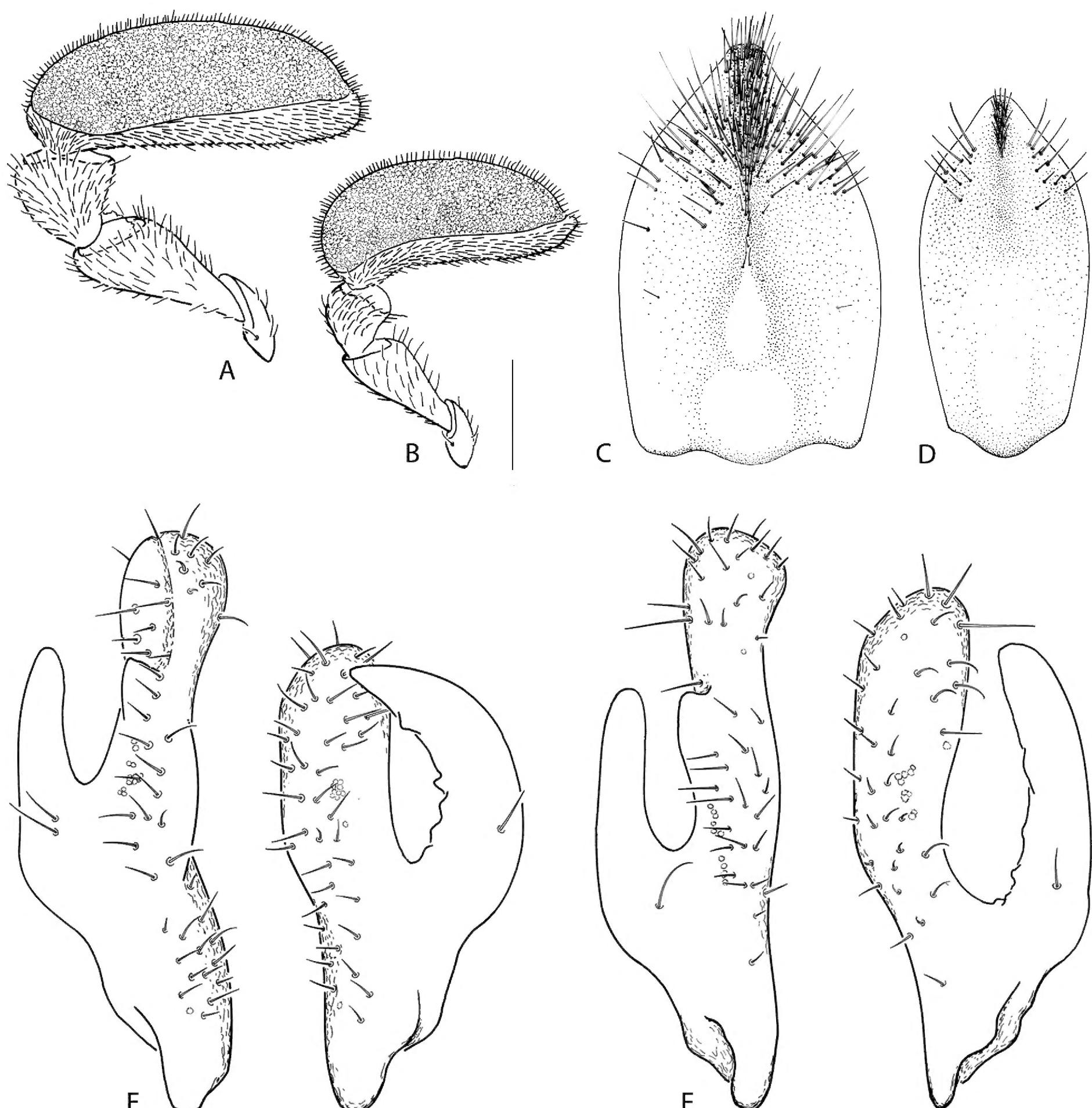


Figure 4. Diagnostic characters of *Mordellochroa humerosa* (Rosenhauer, 1847) and *M. tournieri* (Emery, 1876). **A.** *M. humerosa* male maxillary palpus. **B.** *M. tournieri* male maxillary palpus. **C.** *M. humerosa* male sternite VIII. **D.** *M. tournieri* male sternite VIII. **E.** *M. humerosa* parameres. **F.** *M. tournieri* parameres. Scale bar = 0.1 mm.

approximately 3.0 times longer than wide (Figs 1A, 4A); the female terminal maxillary palpomere is fusiform and with a narrowly truncated apex (Fig. 1B). Sternite VIII in males is 1.54–1.80 ($n = 5$) times longer than wide and densely setose on posterior third (Fig. 4C). The left paramere with dorsal process expanded and rounded apically; the ventral process is shorter than the dorsal one and narrowly rounded apically (Fig. 4E).

The distributional range of *M. humerosa* overlaps partially with that of four other congeners, but the species is easily recognizable. *Mordellochroa abdominalis* and *M. milleri* differ from *M. humerosa*, most apparently by the coloration of the body. While in *M. humerosa*, the body is black with reddish humeral spots in females (Fig. 1A, B), in *M. abdominalis*, the abdomen (at least partially),

mouthparts, antennae (to various extents) and prothoracic legs in males as well as the entire pronotum in females are reddish. In *M. milleri*, the entire body is reddish in both sexes, except for the black elytra. Moreover, both species differ from *M. humerosa* by the absence of the ventral process of the left paramere. Another congener, *M. pulchella*, also differs from *M. humerosa* in body coloration. It has two oval, reddish spots on each elytron in both sexes. The species most closely resembling *M. humerosa* is *M. tournieri* (Fig. 1C). Females of the latter can be distinguished from those of *M. humerosa* by the absence of reddish humeral spots on the elytra. The humeral patches with light pubescence on elytra are distinctly smaller in *M. tournieri* than in *M. humerosa*, extending from the lateral elytral margin just to one-quarter of the elytron

width and often inapparent (Fig. 1C). In *M. humerosa*, the patches are larger, extending from the lateral elytral margin to ca. three-quarters of the elytron width. Male terminal maxillary palpomere is approximately 3.0 times longer than wide in *M. humerosa* (Fig. 4A), while in *M. tournieri*, it is roughly 2.5 times longer than wide (Fig. 4B). The male abdominal sternite VIII, in *M. humerosa*, is 1.54–1.80 ($n = 5$) times longer than wide and densely setose on the posterior third (Fig. 4C). In *M. tournieri*, the sternite is distinctly longer, 2.22–2.28 ($n = 5$) times longer than wide, with short setae arranged along the midline on the posterior quarter, and with a few longer setae on the postero-lateral portions (Fig. 4D). The left paramere of *M. humerosa* has the dorsal process expanded and rounded at the apex (Fig. 4E), while in *M. tournieri* it is expanded and obliquely truncated (Fig. 4F). The right paramere in *M. humerosa* has processes proportionally shorter and overlapping at apices (Fig. 4E), while in *M. tournieri*, the processes are longer and not overlapping (Fig. 4F). *Mordellochroa humerosa* is on average longer than *M. tournieri*: ♂ 2.71–3.54 mm (3.17 ± 0.29 , $n = 6$), ♀ 2.50–3.96 (3.44 ± 0.52 , $n = 9$) versus ♂ 2.29–3.00 mm (2.64 ± 0.25 , $n = 10$), ♀ 2.08–3.42 mm (2.78 ± 0.35 , $n = 10$), respectively. An illustrated identification key of the western Palearctic species was provided by Batten (1977).

Discussion

Mordellochroa humerosa was established based on several specimens collected near the recent Lábatlan village in north-western Hungary (Rosenhauer 1847). Since then, it has been reported from 21 countries within the Mediterranean basin, Pannonian basin, eastern Europe, and central Asia (Emery 1876; Baudi de Selve 1878; Schilsky 1894, 1898; Roubal 1910; Ermisch 1944, 1963, 1969, 1970; Batten 1976, 1977; Odnosum 1992; Horák 2008, 2020).

The northern part of the Pannonian bioregion represents the northern border of the species' distributional range in Europe. The region is characterized by extensive anthropogenic habitats such as crop fields, fruit orchards, fallows, and pasture meadows. Natural habitats are represented mainly by poplar and oak forests, Pannonian steppes, and salt marshes. The occurrence of *M. humerosa* within the Pannonian basin was previously documented only from a few localities in northern Hungary (Fig. 2): Lábatlan (type locality), Berhida, Vonyarcvashegy, and Naszály (Rosenhauer 1874; Kaszab 1979; Merkl 2010). The newly reported sites in southern Slovakia (Fig. 3) are the northern most occurrence sites of the species within Europe. They are located only about 20 km apart from the type locality and about 8 km apart from each other. Immature stages, host plants, and exact habitat preferences of *M. humerosa* remain unknown. From what we have observed, this species inhabits both natural and anthropogenic habitats, where it is usually found on the flowers of the Wild Carrot feeding on

pollen. Although the occurrence of *M. humerosa* within the northern Pannonian basin seems to be very local and rare, further research may reveal additional localities with the presence of the species in southern Slovakia.

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Authors' Contributions

DS, KG, and JK collected the specimens and prepared the manuscript.

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